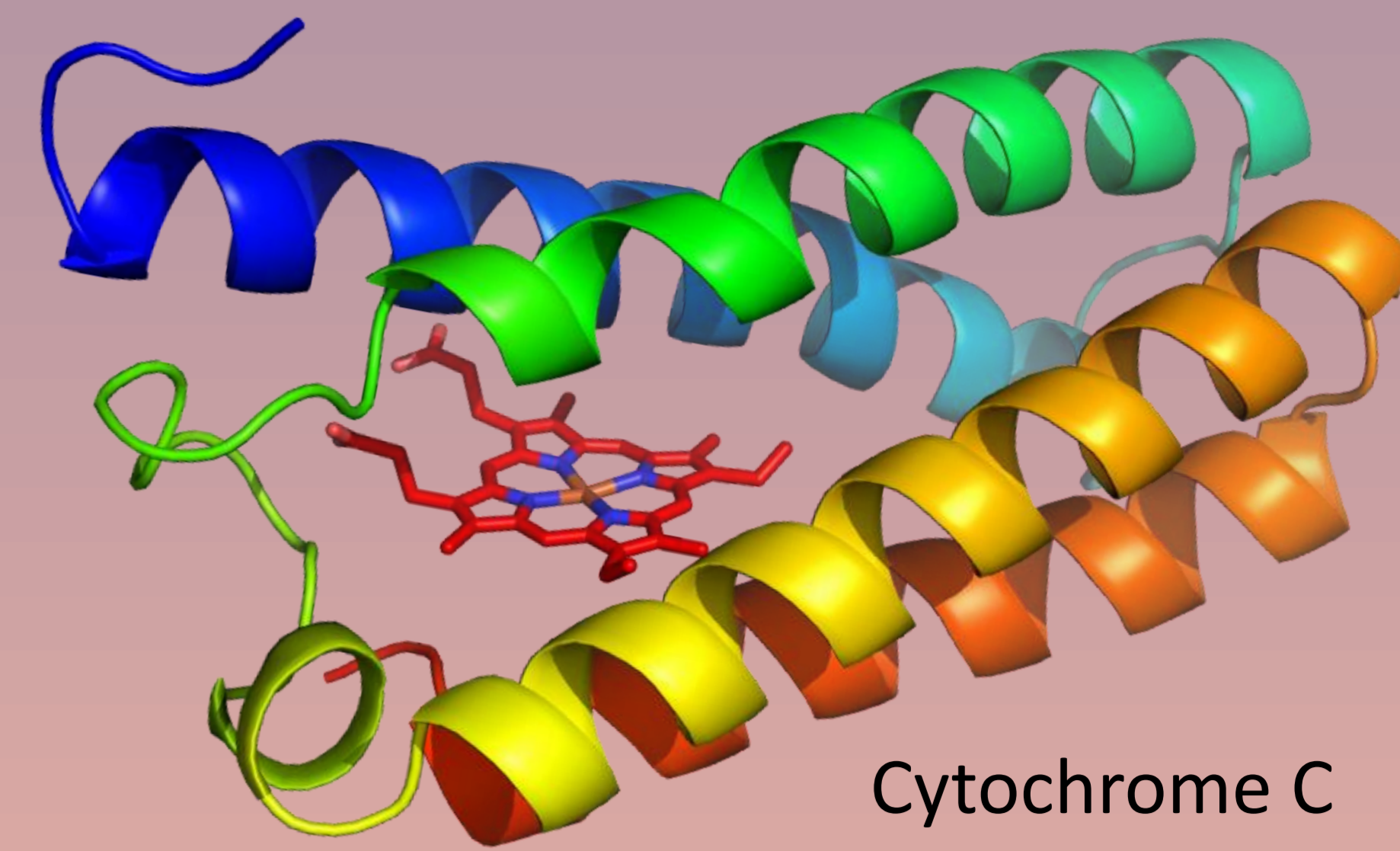
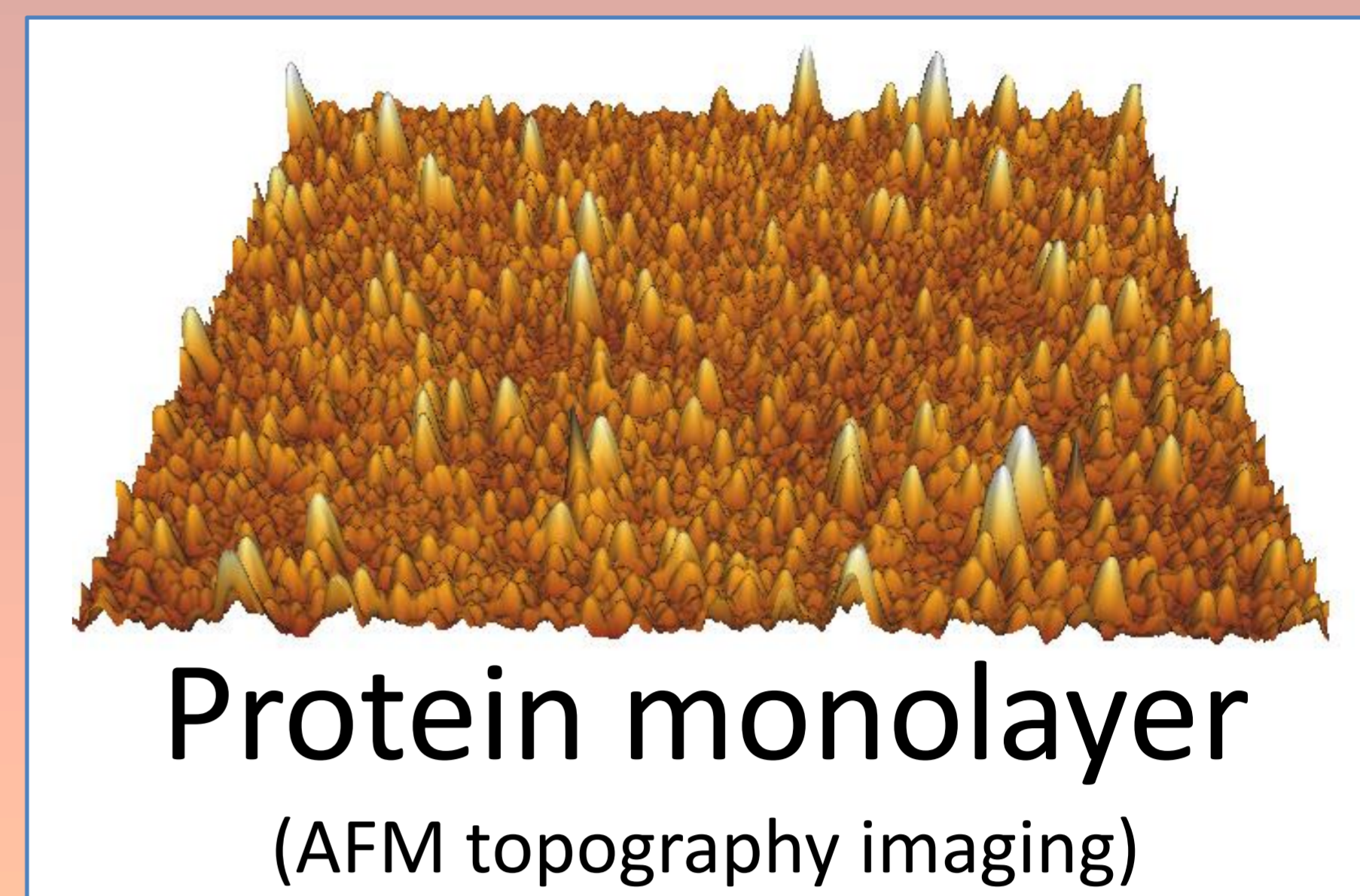


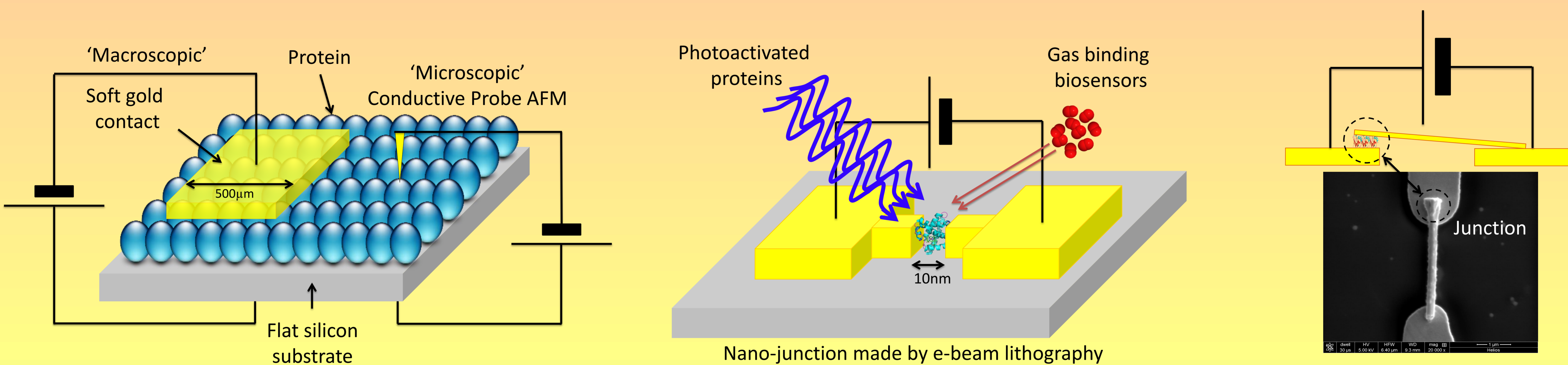
# Proteins in Electricity?! אלקטרוניקה ע"י חלבונים!?



Proteins are the universe's most accomplished chemists. They can perform complicated reactions efficiently and are mediators of charge transport. Surprisingly, proteins can conduct electricity relatively well. How they do this can be modified and the scope for their use in integrated circuits has great potential. However, many mysteries remain...

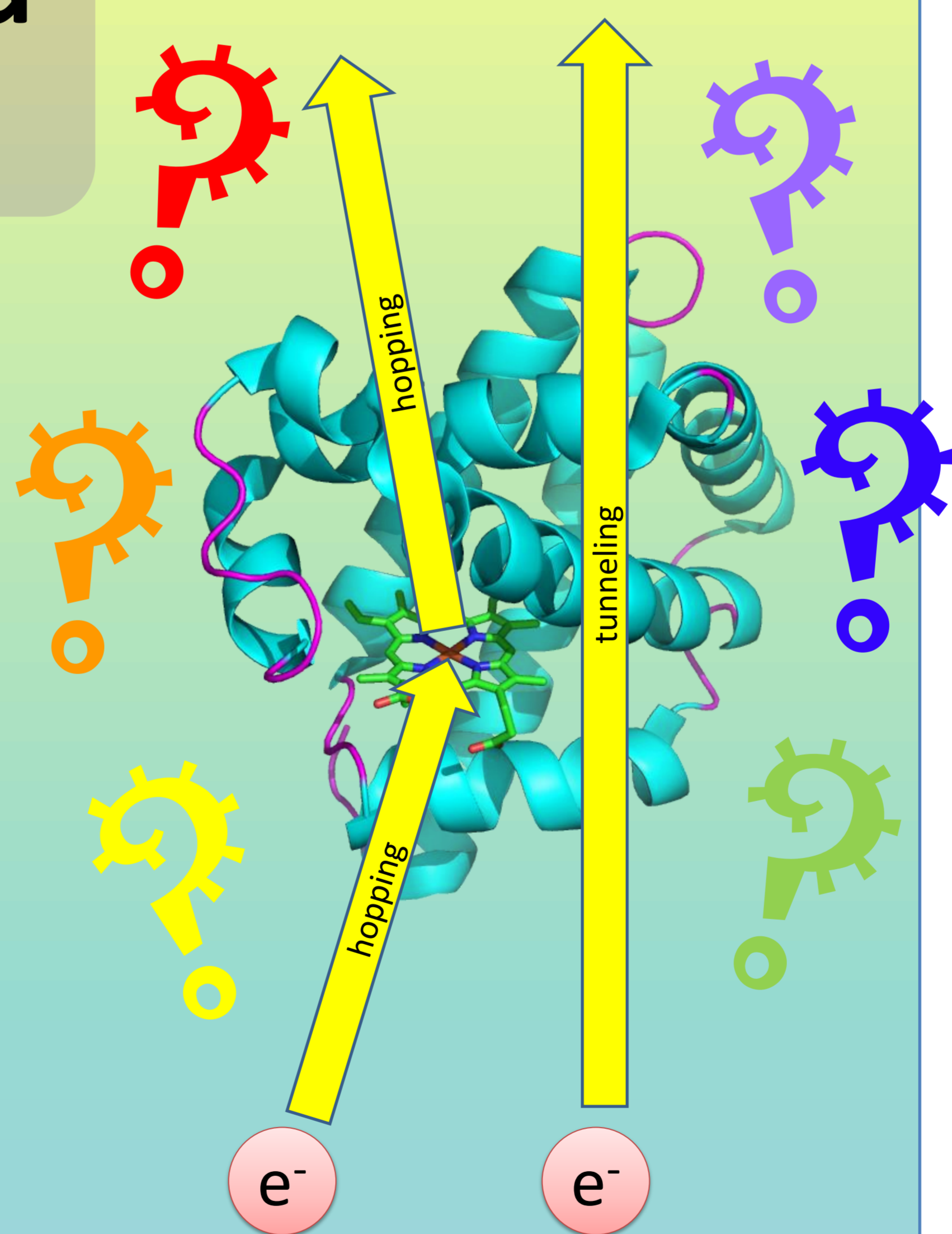


## How do we measure electrical properties of biomolecules?



## How are electrons transported through proteins?

- Thermally activated 'hopping' is the dominant mechanism at  $> 150$  K with 'tunneling' at lower temperatures
- Cofactors (e.g. heme group) significantly enhances electron transport
- Protein conduction resembles those of conjugated organic molecules



## Open questions...

- Is electron transport in proteins somehow related to a proteins' function/structure and did they evolve with this in mind?
- Why do we see tunneling behavior over large temperature ranges?
- What IS the electron transport mechanism over all temperature ranges and can this be predicted with a given protein structure?
- What can be done next to further the scope for using biomolecules in integrated circuits?

